Ordering number : EN2294A

No.2294A

CMOS LSI

LC7821,7822,7823

Analog Function Switch

Use

- Serial data-controlled function select switch suited for use in amplifiers, receivers.

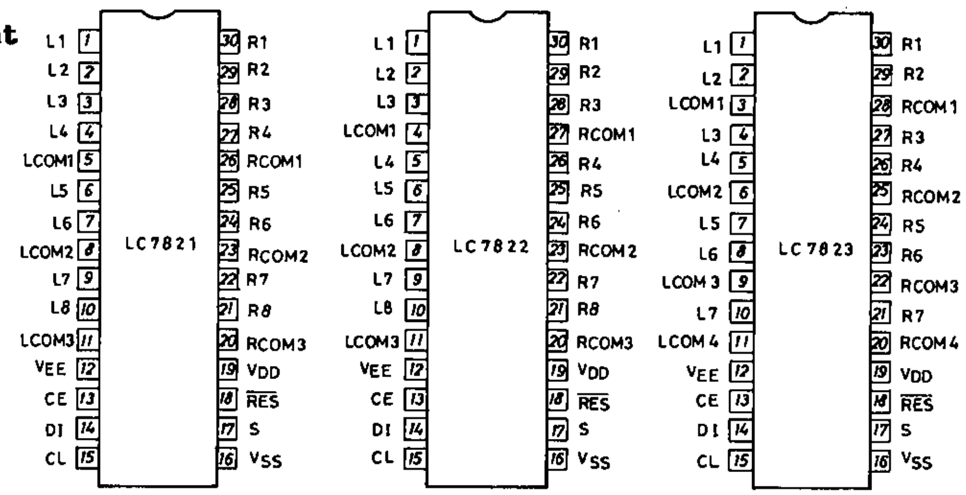
Features

- Analog switches of 8 channels x 2 (LC7823: 7 channels x 2) are contained. Three types are available according to the internal connection.
- Control is exercised by serial data. The LC7821,7822,7823 may be interfaced with a microcomputer (5V-operated) easily.
- Even if two ICs of the same type are used, they may be connected to the common bus line because the S (selector) pin is provided.
- Reset pin used to turn OFF all analog switches
- Wide dynamic range because of ±20V breakdown voltage

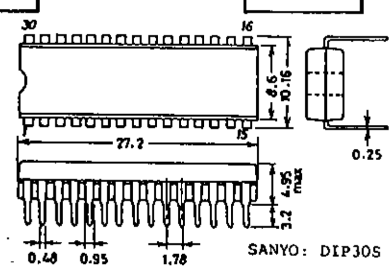
Absolute Maximum Ratings at Ta=25°C

				unit
Maximum Supply Voltage	V_{DD}max	V_{DD}	-0.3 to +20	V
	V_{EE}max	V_{EE}	-20 to +0.3	V
Maximum Input Voltage	V_I1	DI,CL,CE,S,$\overline{RES}$	-0.3 to +20	V
	V_I2	L1toL8,R1toR8, LCOM1 to LCOM4, RCOM1 to RCOM4	V_{EE}-0.3toV_{DD}+0.3	V
Analog Switch ON-State Voltage Difference	$\triangle V_{ON}$	Switch ON	0.5	V
Allowable Power Dissipation	Pdmax	Ta≦75°C	100	mW
Operating Temperature	Topr		-30 to +75	°C
Storage Temperature	Tstg		-40 to +125	°C

Pin Assignment



Package Dimensions 3047A
(unit: mm)

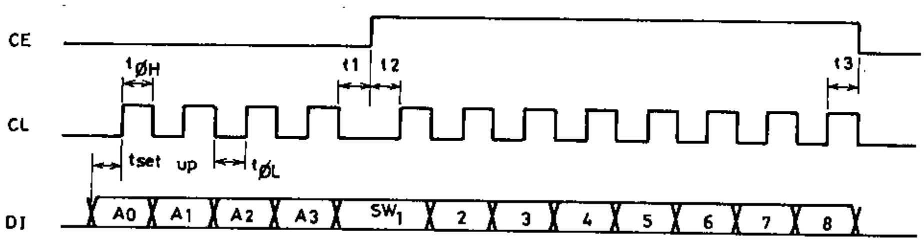


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Allowable Operating Conditions at Ta=25°C, V_{SS}=0V, $|V_{DD}| \geq |V_{EE}|$

			min	typ	max	unit
Maximum Supply Voltage	V_{DD}	$V_{DD}-V_{EE} \geq 12V$: V_{DD}	6.0		18.5	V
	V_{EE}	$V_{DD}-V_{EE} \geq 12V$: V_{EE}	-18.5		0	V
Input "H"-Level Voltage	V_{IH1}	DI,CL,CE	4.0		18.5	V
	V_{IH2}	S,$\overline{RES}$	$0.7V_{DD}$		V_{DD}	V
Input "L"-Level Voltage	V_{IL1}	DI,CL,CE	0		0.7	V
	V_{IL2}	S,$\overline{RES}$	0		$0.3V_{DD}$	V
Analog Switch Input Voltage Range	V_{IN}	L1toL8,R1toR8, LCOM1toLCOM4,RCOM1toRCOM4	V_{EE}		V_{DD}	V
"L"-Level Clock Pulse Width	$t_{\phi L}$	C_L	0.5			µs
"H"-Level Clock Pulse Width	$t_{\phi H}$	C_L	0.5			µs
Setup Time	t_{setup}	CL,DI	0.5			µs
	t_1*	CL,CE	0.5			µs
	t_2*	CL,CE	0.5			µs
	t_3*	CL,CE	0.5			µs
Reset Minimum Pulse Width	t_{wRES}	$V_{DD} \geq 6V$:$\overline{RES}$	1.0			µs
Hysteresis Width	V_H	CL,CE,DI	0.3			V

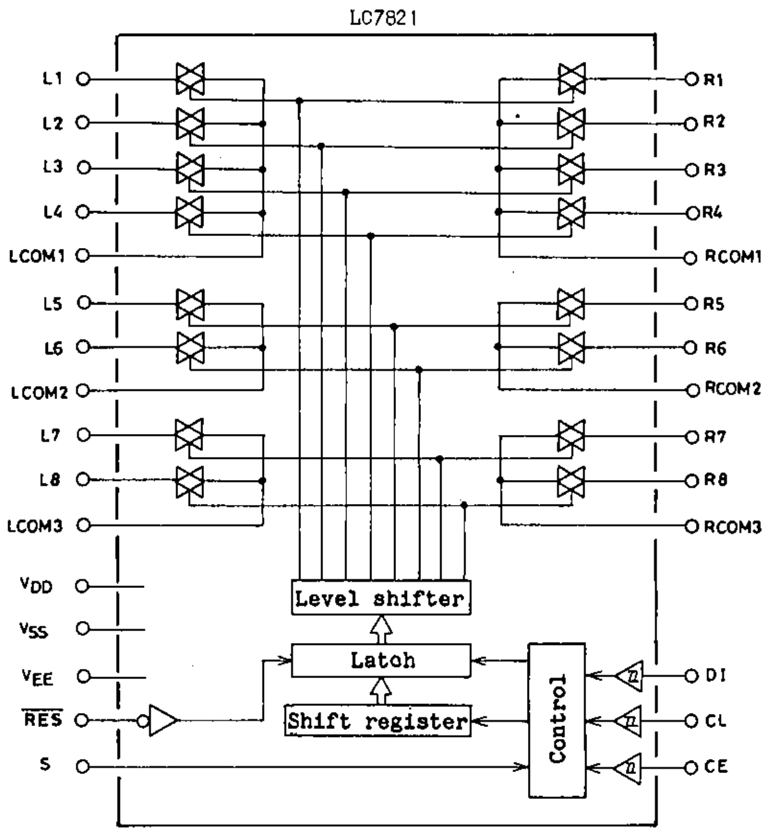
*: CE,CL,DI waveforms

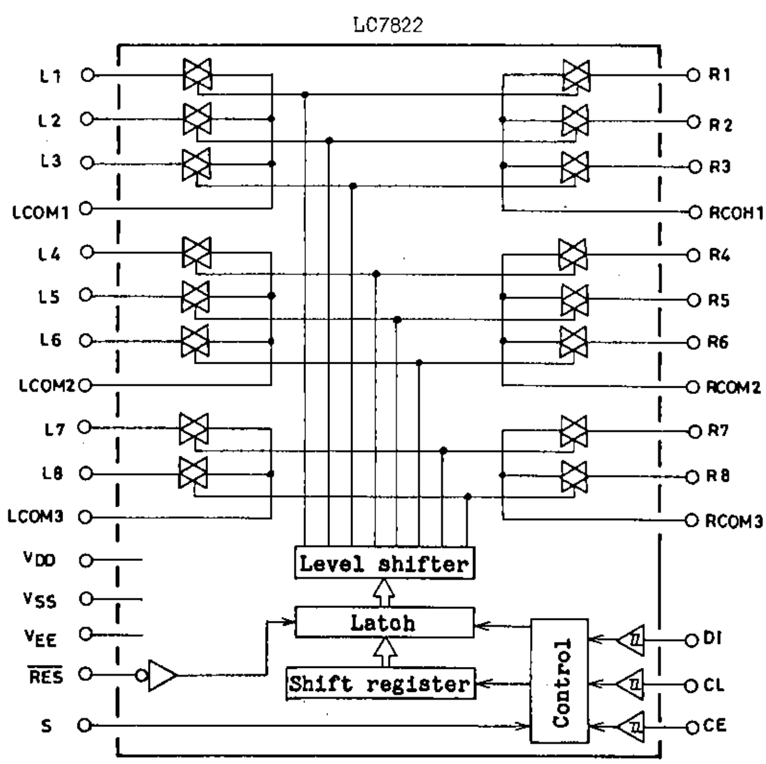


Electrical Characteristics at Ta=25°C, V_{SS}=0V

			min	typ	max	unit
Analog Switch ON-State Resistance	R_{ON1}	I=1mA, $V_{DD}-V_{EE}$=12V: L1toL8,R1toR8,LCOM1toLCOM4, RCOM1toRCOM4		150		ohm
	R_{ON2}	I=1mA, $V_{DD}-V_{EE}$=37V: L1toL8,R1toR8,LCOM1toLCOM4, RCOM1toRCOM4		70		ohm
Total Harmonic Distortion	THD1	V_{IN}=1Vrms,f=1kHz, $V_{DD}-V_{EE}$=37V:L1toL8,R1toR8, LCOM1toLCOM4,RCOM1toRCOM4		0.0015	0.01	%
	THD2	V_{IN}=0.1Vrms,f=1kHz, $V_{DD}-V_{EE}$=37V:L1toL8,R1toR8, LCOM1toLCOM4,RCOM1toRCOM4		0.01	0.05	%
Feedthrough	F_{TH}	V_{IN}=0dBV,f=10kHz, $V_{DD}-V_{EE}$=37V,L1toL8,R1toR8, LCOM1toLCOM4,RCOM1toRCOM4		55		dB
Crosstalk	CT	V_{IN}=0dBV,f=10kHz, $V_{DD}-V_{EE}$=37V:L1toL8,R1toR8, LCOM1toLCOM4,RCOM1toRCOM4		75		dB
Input "H"-Level Current	I_{IH}	V_I=18.5V:DI,CL,CE,S.$\overline{RES}$			10	uA
Input "L"-Level Current	I_{IL}	V_I=0V:DI,CL,CE,S,$\overline{RES}$	-10			uA
Analog Switch OFF-State Leakage Current	I_{OFF}	V_I=V_{EE}toV_{EE}+37V:L1toL8, R1toR8,LCOM1toLCOM4, RCOM1toRCOM4	-10		10	uA
Current Dissipation	I_{DD}	V_{DD}			1.0	mA

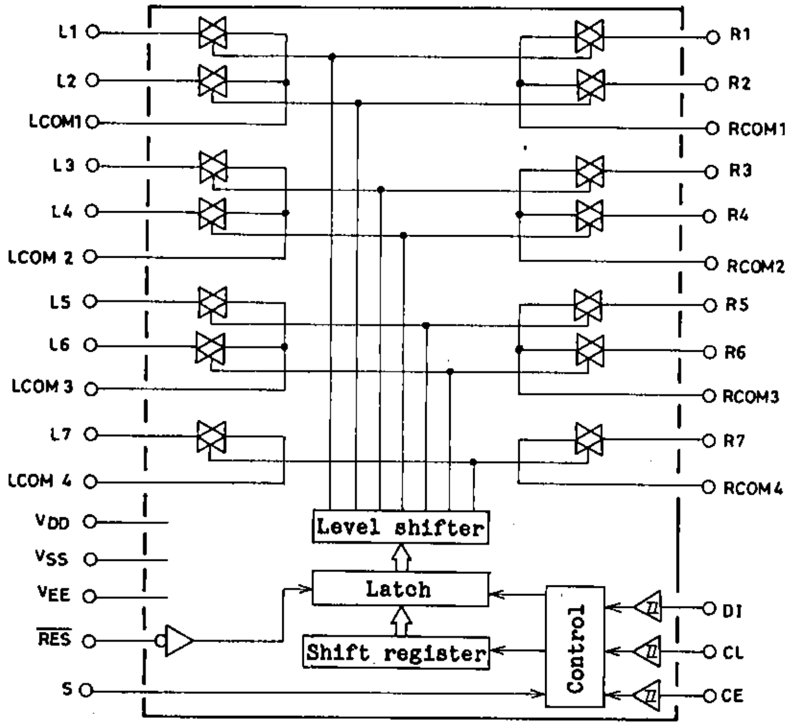
Equivalent Circuit Block Diagram



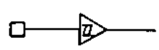
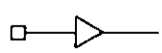
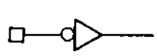


Equivalent Circuit Block Diagram

LC7823



Pin Description

Pin Name	I/O	Internal Equivalent Circuit	Function
V_{DD}, V_{SS}, V_{EE}			Power supply pins
L1toL8, R1toR8, LCOM1toLCOM4, RCOM1toRCOM4		See Block Diagram.	Input/output pins for analog switches.
CL, DI, CE	I		Serial data input pins (Schmitt buffer) CL --- Clock input pin DI --- Data input pin CE --- Chip enable pin
S	I		Select pin in the two ICs-used mode When the S pin is brought to "L" or "H" level, the addresses will become as shown below.
$\overline{RES}$	I		Reset pin When power is applied, the state of the analog switches will be indeterminate. When this pin is brought to "L" level, all analog switches will be turned OFF.

Type No.	S Pin	Address			
		A_0	A_1	A_2	A_3
LC7821	L	0	1	0	1
	H	1	1	0	1
LC7822	L	0	0	1	1
	H	1	0	1	1
LC7823	L	0	1	1	1
	H	1	1	1	1

Operation Description

1. Data input method

The LC7821, 7822, 7823 are controlled by inputting serial data to the CL, DI, CE pins. Data consists of 12 bits in all (address: 4 bits, data: 8 bits).

1st bit											last bit
A_0	A_1	A_2	A_3	SW 1	2	3	4	5	6	7	8
Address				Switch select							

Each switch No. corresponds to analog switches L1 to L8, R1 to R8.
Set the bit of a switch to be turned ON to 1.

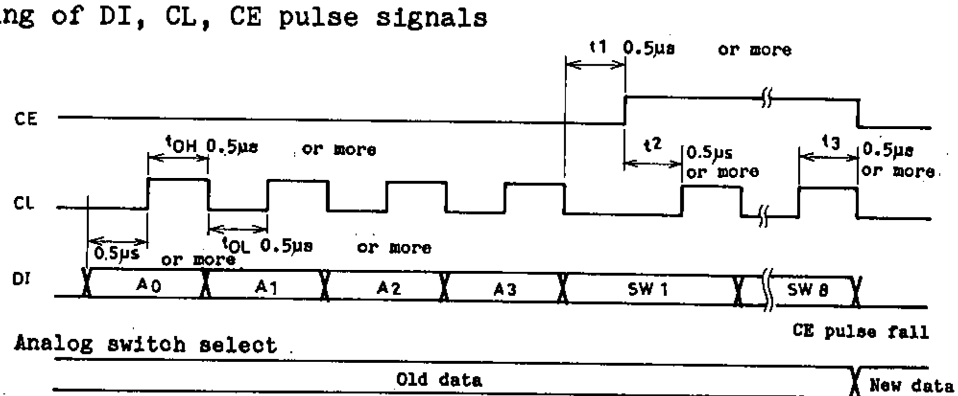
0 ------- OFF
1 ------- ON

The address is used for chip select when connected to the common bus line. When the S pin is brought to "L" or "H" level, the transmit data will become as shown below.

Type No.	S Pin	Address			
		A_0	A_1	A_2	A_3
LC7821	L	0	1	0	1
	H	1	1	0	1
LC7822	L	0	0	1	1
	H	1	0	1	1
LC7823	L	0	1	1	1
	H	1	1	1	1

Note: For the LC7823, the bit of switch 8 becomes "don't care" (0 or 1). The reason for this is that the LC7823 contains 7 channels x 2 of analog switches.

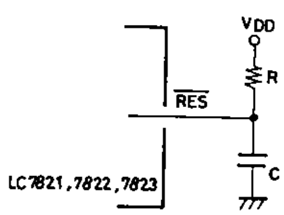
2. Timing of DI, CL, CE pulse signals

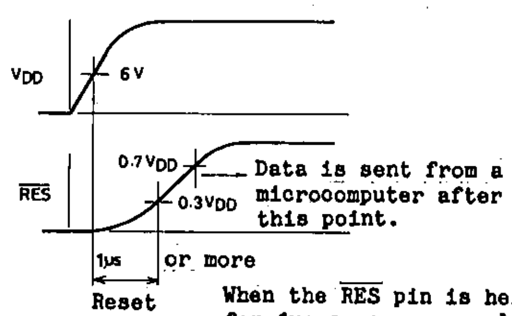


Data is fetched into the inside on the positive transition of the CL pulse and latched on the negative transition of the CE pulse.

3. Reset pin

When power is applied, the state of the analog switches will be indeterminate. All analog switches may be turned OFF by connecting C, R to this pin externally.





When the RES pin is held at "L" level for 1usec. or more, all analog switches will be turned OFF.